

FIELD OF THE INVENTION

BACKGROUND OF THE INVENTION

One conventional system for ensuring a constant probability of false alarm involves minimizing automatic gain control (AGC) jittering using highly accurate analog components. A disadvantage to this approach is the increased system cost due to the high cost of highly accurate analog components.

Both of these conventional systems will only allow normalization based on a combined measurement of both signal and interference power. However, in order to ensure a constant

even for relatively high signal power. Moreover, because the ISCP measurements are readily available at the L1 processor, no additional hardware is needed.

The present invention is described by first providing an overview of a portion of a third-generation CDMA mobile system, followed by a description of propagation path detection, probability of false alarm, and physical layer measurements, and finally a description of adapting searcher thresholds according to the preferred mode of the present invention.

A. Overview of Portion of Third-Generation CDMA Mobile System

Fig. 1 illustrates a block diagram of an overview of a portion of a third-generation CDMA mobile system 100, including an automatic gain control (AGC) 101, an analog-to-digital (A/D) converter 102, a third-generation (3G) digital base band receiver 103, and a physical layer (L1) processor 104. Optimum usage of the digital base band receiver 103 requires constant average power level of a digital input signal r_n . The same applies to the analog input signal of the A/D converter 102. To ensure a fairly constant power level over time, the received analog signal $r(t)$, which is the total received signal power of all mobile phones plus thermal noise, is scaled by the AGC 101. The AGC 101 typically scales the analog signal $r(t)$ by comparing a filtered analog power measurement of the analog signal $r(t)$ against a predefined target power known as an AGC set-point α . The accuracy of the AGC 101 is limited due to temperature effects and aging of its analog components.

The digital base band receiver 103 of Fig. 1 contains a RAKE receiver (not shown), which scans a power delay profile of the digital input signal r_n for resolvable propagation paths using searcher thresholds (which are dynamically adapted, that is, set by a preferred mode of the present invention); accurate power measurement during this scanning is essential. The

detection variable z with threshold T . If detection variable z is greater than threshold T , then a valid propagation path is detected; otherwise, no valid propagation path is detected.

At the end of an observation period, thresholds T are used to identify a certain time offset as a valid propagation path. Multiple correlation results may be combined non-coherently per observation period. The characteristic design parameters associated with a threshold T are probability of detection (i.e., power measurement exceeding threshold T at valid time offset, that is, when the signal is present) and probability of false alarm (i.e., power measurement exceeding threshold T at invalid time offset, that is, when the signal is absent and only noise is present).

The maximum number of paths is determined by the RAKE receiver portion 103-1. Valid propagation paths may be stored in a database such as 104-1, sorted, and then the propagation paths having the highest detection variable z may be selected. However, history may also be taken into account resulting in certain propagation paths with the highest detection variables not being selected; this is known as rules-based selection. Reasons for not selecting a propagation path with a high detection variable z include, but are not limited to, a likelihood that two propagation paths will merge into one another, or that a propagation path will extinguish at a certain point.

C. Probability of False Alarm

Typically, the observation period and thresholds are chosen such that the probability of false alarm stays below a certain value (e.g., $1e^{-4}$) while still ensuring an acceptable probability of detection (i.e., > 0.9) depending on available signal power. The knowledge and constancy in particular of the probability of false alarm is essential for allowing efficient finger management and thus important for the overall performance of the digital base band receiver 103.

Normalizer 303 then normalizes the total ISCP (x) over y, which is the number of uplink connections U times the number of threshold updates (t_{update}) per 80ms measurements. More specifically, the number of uplink connections U times the threshold update t_{update} divided by 80ms is stored in buffer 304; the normalizer 303 divides the total ISCP (x) by the value stored in
5 buffer 304 (i.e., y, or total ISCP·80ms/U· t_{update}) to calculate the normalized value of the total ISCP (x') for the present observation period.

Scaler calculator 305 then divides the normalized value of the total ISCP (x') by a previous normalized value of the prior observation period total ISCP (y'), which has been stored in ISCP buffer 306, to calculate a scaler value (x''). Scaler 307 then obtains previous searcher
10 thresholds (y'') for each of the uplink connections ($u = 0$ to $U-1$) from a searcher threshold database 308, scales each the previous searcher thresholds (y'') for each of the uplink connections using scaler value x'' by multiplying the scaler value x'' by each of the previous searcher thresholds (y''), and restores the scaled searcher thresholds back in the searcher threshold database 308, thereby adjusting for the jitter in the AGC 101 (shown in Fig. 1). These
15 scaled searcher thresholds are then used as the newly-adapted search thresholds used to detect propagation paths in a communications signal.

While the invention has been described in detail with particular reference to certain embodiments thereof, the invention is capable of other and different embodiments, and its details are capable of modifications in various obvious respects. As would be readily apparent to those
20 skilled in the art, variations and modifications can be affected while remaining within the spirit and scope of the invention. Accordingly, the foregoing disclosure, description, and drawing figures are for illustrative purposes only, and do not in any way limit the invention, which is defined only by the claims.